How big is the problem

Lifetime incidence risk is 4.5%

50,000 deaths per year in US, 3rd leading cause of cancer death in men and women

Average age at diagnosis is 68 yrs

Genetic factors in 30%

Ulcerative colitis and crohn’s are both associated with increased incidence

Diets with red meat; obesity also independent risk factor
Colorectal cancer screening

From 2002 to 2010, rate of screening increased from 52% to 65%.

During the same time, annual incidence of new colon cancers declined by 2% to 4%.

Age of diagnosis is 68yrs.

From 2009-2013, 94.3% were over age 45, 24% were age 65-74.

In US, slightly higher male rate 47 vs 36 per 100,000.
Colorectal Statistics

Prevalence of CRC in patients with UC is 3.7% influenced by duration, extent and severity

Crohn colitis is associated with an increased risk but extent is not clear

Diets high in processed and red meats

Alcohol use (2 or more drinks per day)

Smoking has a 2 fold increase in diagnosis of an adenoma and a higher CRC mortality rate

Multiple studies support and association with obesity
Protective factors

Physical activity, meta-analysis showing a 20-30% lower risk of CRC

Aspirin and NSAIDs show some evidence in reduced recurrence of sporadic adenomas in 3 studies (not recommended for protection due to risks)

Dietary supplementation with Vit A,C,E,D, folate and fiber have been hypothesized but no evidence exists to show a decrease in risk

Calcium supplementation has been supported to show an impact in preventing CRC in observational and randomized experimental studies
Adenomas

25-40% of asymptomatic patients older than 50 in the US have 1 or more adenomas

Adenomatous polyps are approximately 50-66% of polyps
Screening and detection

Recommended at age 50 unless risk factors including family history are present.

Annual fecal occult blood, annual fecal immunochemical test, flexible sigmoidoscopy every 5 years, colonoscopy every 10 years, double-contrast barium enema every 5 years, or CT (virtual colonoscopy) every 5 years.

Stool DNA is another option but interval is uncertain

Most patients still arrive with symptomatic presentation
Colonoscopy

1 per 1000 major complications (perforation and major bleeding)

4x greater risk of perforation in patients who had a polypectomy

8.7 per 1000 risk of bleeding if a polypectomy was performed

Adverse events more common in older patients or had a history of diabetes, stroke, COPD, heart failure

Chromoendoscopy, magnification endoscopy, narrow band
Colonoscopy

Detection rates for neoplasms were significantly higher for clinicians who, on average, took longer than 6 minutes for withdrawal of the colonoscope, compared with those who took less than 6 minutes.
Diagnosis, Evaluation

Injection of permanent tattoo to the colon lesion circumferentially for surgical planning

6-8% chance of a synchronous lesion

If not possible to complete a colonoscopy, then completion colonoscopy should be done at 3 months after surgery

CEA (independent predictor of poor outcome), LFTs, CT scan

20% have metastatic disease at presentation

PET not routine
Staging

American Joint Committee on Cancer (AJCC)/TNM system with assessment of completeness of resection

R0 - complete tumor resection with all margins histologically negative

R1 - incomplete tumor resection with microscopic surgical resection margin involvement (grossly uninvolved margins)

R2 - incomplete tumor resection with gross residual tumor that was not resected
Surgical Management

Amenable to resection with curative intent vs palliation

80-90% of patients are appropriate for surgical resection for cure

No evidence that mechanical bowel prep improves outcomes, including surgical site infections

Oral antibiotic administration after a mechanical bowel preparation has the lowest incidence of surgical site infection

Prophylactic antibiotics to be given within 60 minutes of incision and not beyond 24 hrs
Surgical Treatment of Primary Tumor

1. Thorough exploration to detect synchronous lesions, advanced malignant disease (carcinomatosis, adjacent organ involvement) and pathology including adhesions, hernias, cholelithiasis, cirrhosis

2. Extent of resection corresponds to lymphovascular drainage, en bloc

3. At least 5cm negative margin on either side of the tumor

4. Resection of involved adjacent organs should be en bloc

5. Sentinel lymph node does not replace standard lymphadenectomy
Prophylactic Oncological Resection

Oophorectomy advised for grossly abnormal ovaries or contiguous extension of the colon cancer but routine prophylaxis not recommended.

Ovaries are site for colon metastasis in fewer than 15%.

Krukenberg tumor

If one ovary is involved, a bilateral oophorectomy should be performed.
Synchronous stage IV disease

15-20% have liver or lung metastases at the time of initial presentation.

20-25% of these patients have potentially resectable disease.

Individualized treatment based on a comprehensive multidisciplinary evaluation.

Some patients will be converted to resectable disease after chemotherapy.
Unresectable Stage IV disease

Palliative intervention of the symptomatic primary tumor is considered but not routinely recommended

Bleeding - resection to stop bleeding should follow oncologic principles

Obstruction - may include a definitive surgical resection with primary anastomosis but each is individualized

Locoregional recurrence - multidisciplinary team for curative resection
Peritoneal Carcinomatosis

Occurs in 10-15% with colorectal cancer

May include surgical cytoreduction

Role of intraperitoneal chemotherapy studies is insufficiently defined

Morbidity with multivisceral resection and hyperthermic intraperitoneal chemotherapy is 60-80%
Resection

Liver is the most common site of metastatic disease

Intraoperative ultrasound

12 lymph nodes should be examined to minimally stage cancer
Enhanced Recovery

Key factors delaying recovery include: parenteral analgesia, IV fluids due to gut dysfunction, lack of mobility

Preoperative psychologic preparation, normothermia, nausea and ileus prevention, early feeding, opioid-sparing analgesia, evidence-based postoperative care including early Foley catheter removal and VTE prophylaxis
Enhanced Recovery

Preadmission counseling, discussion of milestones, discharge criteria

Ileostomy education, marking, counseling on dehydration avoidance

Creating an ostomy is an independent risk factor for a prolonged length of stay
Preadmission Nutrition and Bowel Preparation

1. Clearls may be continued < 2hrs before general anesthesia; leads to small gastric volume and higher gastric pH at time of surgery (Practice guidelines of ASA and European Society of Anaesthesiology)

2. Carbohydrate loading encourage before surgery in nondiabetic patients

3. Mechanical bowel preparation plus oral antibiotic bowel preparation before colorectal surgery is the preferred preparation and is associated with reduced complication rates.
Prehabilitation

Prehabilitation before elective surgery may be considered for patients undergoing elective colorectal surgery with multiple comorbidities or significant deconditioning. Preset orders should be used as a part of the enhanced care pathway.
Surgical Site infection

A bundle of measures should be in place to reduce surgical site infection

1. Chlorhexidine shower, MBP, oral antibiotics, ertapenem within 1 hr of incision, chlorhexidine prep of surgical field

2. Wound protector, gown and glove exchange before fascial closure, dedicated wound closure tray, limit OR traffic

3. Postop - removal of dressing within 48 hrs and daily washings of incision with chlorhexidine

4. Euglycemia maintenance, normothermia
Pain Control

A multimodal, opioid-sparing, pain management plan should be used and implemented before the induction of anesthesia.

1. Scheduled use of gabapentin, NSAIDs, acetaminophen

2. transversus abdominis plane (TAP) block with a local anesthetic has been associated with decreased length of stay compared with systemic opioids in laparoscopic colorectal surgery. TAP blocks performed before surgery appear to provide better analgesia than TAP blocks performed at the end

3. Thoracic epidural analgesia is recommended for open colorectal surgery, but not for routine use in laparoscopic colorectal surgery
Nausea and Emesis

Antiemetic prophylaxis should be guided by preoperative screening for risk factors for postoperative nausea/vomiting

administration of dexamethasone at induction of anesthesia and ondansetron (or another 5-hydroxytryptamine 3 antagonist) at emergence from anesthesia.

17 randomized controlled clinical trials evaluating the efficacy of preoperative gabapentin as prophylaxis for PONV in abdominal surgery, and a quantitative meta-analysis shows that the pooled relative risk of nausea and vomiting is lower in patients who receive preoperative gabapentin.
Fluid management

Maintenance infusion of crystalloids should be tailored to avoid excess fluid administration and volume overload.

Crystalloid or colloid preloading does not prevent hypotension induced by neuraxial blockade, because total blood volume is unchanged after neuraxial blockade.

Low dose of vasopressors, not intravenous fluids, restores colonic perfusion in normovolemic hypotensive patients after epidural blockade.

A maintenance infusion of 1.5 - 2 mL/kg/h of balanced crystalloid solution is sufficient to cover the needs derived from salt–water homeostasis during major abdominal surgery.
IV fluids

Balanced chloride-restricted crystalloid solutions should be used as maintenance infusion in patients undergoing colorectal surgery.

In high-risk patients and in patients undergoing major colorectal surgery associated with significant intravascular losses, the use of goal-directed fluid therapy is recommended.

- hypovolemia, such as cardiac output, stroke volume, oxygen delivery, oxygen extraction, or mixed venous oxygen saturation or based on dynamic indices of fluid responsiveness.

Intravenous fluids should be discontinued in the early postoperative period after recovery room discharge.
Surgical Approach

A minimally invasive surgical approach should be used whenever the expertise is available and appropriate.

The routine use of intra-abdominal drains and nasogastric tubes for colorectal surgery should be avoided.
Post-Op Interventions

Early and progressive mobilization leads to shorter length of stay

Little evidence as to the best practice to increase mobilization

Patients should be offered a regular diet immediately after elective colorectal surgery

Sham feeding (i.e., chewing sugar-free gum for $\geq 10$ minutes 3 to 4 times per day) after colorectal surgery is safe, results in small improvements in GI recovery, and may be associated with a reduction in the length of hospital stay.

Alvimopan
Foley catheters

Urinary catheters should be removed within 24 hours of elective colonic or upper rectal resection when not involving a vesicular fistula, irrespective of TEA (thoracic epidural) use.

Urinary catheters should be removed within 48 hours of midrectal/lower rectal resections.
Obstructing or Perforated

Near ileocecal valve a right hemicolecctionomy with anastomosis is common

Distal obstructions often have stool

In gross fecal contamination, resection of the tumor and perforation with a colostomy or ileostomy is recommended; proximal diversion is also indicated in unstable patients
(A) Axial CT images with IV contrast in a patient with an obstructing sigmoid adenocarcinoma (arrow). (B) There is marked dilatation of the cecum with an air fluid level. Note omental caking due to metastases.
Hydrosoluble contrast enema reveals a 4-cm annular carcinoma at the rectosigmoid junction.
Obstruction Before and After Metal Stent
Adjuvant Treatment

Node Positive Stage III should be considered for post-operative adjuvant chemotherapy - multiple randomized trials have demonstrated risk reduction of one third.

Common regimen is oxaliplatin with fluoropyrimidine (FOLFOX) for 6 months.

Trials underway comparing 3 vs 6 months.

In node-negative disease, chemotherapy is controversial.

High-risk stage II colon cancer with poorly differentiated tumors, lymphovascular invasion, bowel perforation, inadequate margins, T4 lesions, or low nodal counts, adjuvant is considered.
Surveillance

Identify recurrent disease at a resectable stage

Identify metachronous polyps or cancer at an early stage

T3 or greater followed with H&P, CEA every 3 months for 2 years and then every 6 months for 3 years. Rising CEA should include further imaging studies and colonoscopy

Annual CT with chest, abdomen, and pelvis

Colonoscopy 1 year post-operatively or within 6 months if complete colonoscopy was not previously completed due to obstruction
Surveillance

Post-operative colonoscopy free of polyps, repeat surveillance every 3 years

In patients in an adenoma or hereditary syndrome, annual colonoscopy is recommended
Atypical Colorectal Neoplasms

primary colorectal lymphoma (PCL), carcinoids (neuroendocrine tumors [NETs]), and gastrointestinal stromal tumors (GISTs)
Primary Lymphoma of the GI system

10% of lymphoma with most common in stomach

1% of colorectal malignancies, age 55, 2:1 male:female

More often right colon, non-Hodgkin lymphoma B-cell

Secondary involvement from another primary must be excluded

(1) no peripheral lymphadenopathy, (2) absence of enlarged mediastinal lymph nodes, (3) white blood cell count and differential within normal limits, (4) primary involvement of the bowel with only proximal lymphadenopathy, and (5) lack of involvement of liver and spleen.
Carcinoids

25% occur in GI system (more common in bronchopulmonary system)

1% of colon tumors

Females more than males and age 65 most common; Rectal NETs are 10 years earlier

NETs are from enterochromaffin cells or Kluchitschky cells within crypts of Lieberkuhn in colon, Right sided

Fewer than 5% develop carcinoid syndrome with flushing, diarrhea
GIST

Most common mesenchymal tumor from the interstitial cells of Cajal

Age 60 and men more than women

More commonly in stomach; Colorectal GISTs are 5-10%

Hallmark is c-KIT and mostly in the transverse and descending colon

Metastasize to the liver and peritoneum and rare metastasis to lung, bone, lymph
Summary

Screening starting at age 50 unless family history or symptoms indicate earlier
Most patients still present with symptoms rather than from screening
Colonoscopy remains the mainstay of screening and early resection of polyps
Surgical management including resection has a role in both curative resection and palliation, 12 lymph nodes are required
Adjuvant therapy is for high risk Stage II and Stage III-IV
Surveillance is essential to identify resectable recurrence